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The Domain of Physiology, or Nature in thought and language. By T. Sterry Hunt, LL.D. 8vo, pp. 27. Boston, 1882. From the author.

A Revision of the Cis-Mississippi Tertiary Pectens of the United States, pp. 16. Remarks on the Molluscan genera *Hippagus*, *Verticordia* and *Pecchiolia*, pp. 12. Note on the approximate position of the Eocene deposits of Maryland. By Angelo Heilprin. pp. 6. Proceedings of the Academy of Natural Sciences of Philadelphia. Philadelphia, 1882. From the author.

Proceedings of the United States National Museum. Washington, 1882.

The tailed Amphibians, including the Cæcilians. A thesis, presented to the Faculty of the Michigan University. By W. H. Smith. 12mo, pp. 158, bound. Detroit, 1877.

A case of Polymely in Batrachia. By J. S. Kingsley. 8vo, pp. 8, plate. Ext. from the Proceeding of the Boston Society of Natural History. Boston, 1881. From the author.

The Winter Birds of Minnesota. By T. S. Roberts. 8vo, pp. 10. Extract from the Ninth Report of the Geological and Natural History Survey of Minnesota, for the year 1880; Minneapolis, 1880. From the author.

Transactions of the American Institute of Mining Engineers.

Geological Relations of the Limestone belt of Westchester county, New York. By James D. Dana. 8vo, pp. 80, plate, maps, cuts. Extract from the American Journal of Science. New Haven, 1881. From the author.

Beiträge zur Paläontologie Oesterreich-ungarns und des Orients. Herausgegeben von E. v. Mojsisovics und M. Neumayr. Vol. I, Part I and II, 4to, pp. 70, 13 plates. Wien, Jan., 1882. From the publishers.

Die Stegocephalen aus den Rothliegenden des Plauerschen Grundes bei Dresden. Von Hermann Credner in Leipzig. Vol. II, 8vo, pp. 32, 2 plates. Berlin, 1881. From the author.

Die fossilen Saurier in dem Kalke des Rothliegenden von Niederhässlich im Plauerschen Grunde bei Dresden. Dr. H. B. Geinitz und Dr. J. Deichüller. 8vo, pp. 2. (Extract from) Mineralogisch-geologisches und prähistorisches Museum in Dresden, 1882. Dresden, 1882. From the authors.

Anatomische Notizen über *Heloderma horridum* Wieg. Von Dr. J. G. Fischer in Hamburg. 8vo, pp. 16, plate. Hamburg, 1882. From the author.

Une Page de L'Histoire D'une Beleie ou La Catologie il y Cinquante ans. Discours prononcé a la Seance publique de la Classe des Sciences. Par M.P.-J. Van-Beneden. 8vo, pp. 34, plate. Brussels, 1882. From the author.

Liste des Membres de la Société Géologique de France, au 1^{re} Fevrier, 1882. 8vo, pp. 32. Paris, 1882. From the society.

Ottawa Field-Naturalists' Club, 1879-80. Transactions No. 1, 8vo, pp. 64, plate, 1880-81. Transactions No. 2. 8vo, pp. 44, plate, with the address of President Fletcher. Ottawa, Canada. From the president.

The Scientific Roll and Magazine of Systematized Notes, conducted by Alexander Ramsey, F.S.S. Climate, Vol. I, 8vo, pp. 40. London, Feb., 1882. From the conductor.

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GENERAL NOTES.

BOTANY.¹

THE STUDY OF LICHENS IN NORTH AMERICA.—The interesting plants which botanists term lichens, but which the non-botanical are wont to call "mosses" or "tree mosses," those greenish-gray or grayish-green, sometimes blackish or brownish, growths on bark, boards, rails and rocks are likely to acquire a new interest, and to be much more studied than they have been heretofore.

¹Edited by PROF. C. E. BESSEY, Ames, Iowa.

As microscopes become cheaper and less cumbersome, and as information as to the general structure of lichens becomes more available, many students will turn their attention to these curious products of the vegetable kingdom. Indeed, few of the thallophytes recommend themselves in as many ways to the laboratory worker as do the lichens. Their curious dual structure, their colorless filaments (hyphæ), contrasting strongly with the roundish green cells (gonidia), will alone furnish material for much close observation, and if the student permits himself to inquire as to the theories of Schwendener, and Minks, he need have no fears of speedily exhausting the study. Then, too, the various forms of fruiting, the differences in the spores and spore-sacs (asci) with the development of the latter may well claim the prolonged attention of the student.

As a most important aid to the study of the lichens we have now the first part of the long promised "Synopsis of the North American Lichens,"¹ from the hand of Professor Edward Tuckerman, than whom no one is better able to write upon this subject. Long ago (in 1848), Professor Tuckerman gave us a little book, now rare, "A Synopsis of the Lichenes of New England, the other Northern States, and British America," and in 1872 his "Genera Lichenum; an Arrangement of the North American Lichens." We now have Part I of what will doubtless be for many years the standard manual of our lichens. The work being the result of the author's life-long studies, we may reasonably look for much of stability in the arrangement, and in the limits he has assigned to species, genera, and other groupings. Indeed, we notice but few changes in comparing this work with "Genera Lichenum," and these are all of minor importance.

The method of the book leaves nothing to be desired, the specific descriptions being full, and very carefully written. The separation of the species into tribes or sub-genera is equally well done, and the student must be dull indeed who cannot readily follow the author. The key to the arrangement, which precedes the descriptive portion, includes all the genera of North American lichens, seventy-two in number, while this part of the work treats of but forty-three of these.

It may be interesting to note what the author has to say upon several questions which have been under discussion in botany. As to their relationship we find (p. v), "The lowest divisions of vegetable life may still be recognized as Algæ, Lichenes, and Fungi; and conveniently associated together under the designation of Thallophytes; * * * * and there is no doubt, notwithstanding the numerous and now startling discrepancies of these vast groups, that they stand in close natural relations to

¹A Synopsis of the North American Lichens. Part I, comprising the Parmeliacei, Cladonieæ, and Cœnogonieæ; by Edward Tuckerman, M. A., author of Genera Lichenum. Boston : S. E. Cassino, Publisher. 1882.

each other. Lichenes are reckoned as intermediate between the other two classes of Thallophytes; but all the limits are uncertain." As to the now famous question regarding the autonomy of lichens, after describing hyphæ and gonidia, we find (p. vi.) "But we are not quite at liberty to stop here. The marked contrast of hypha and gonidium was open to a hypothetical explanation, based on the apparent relations of these organs to what seemed the same in other classes of Thallophytes, which suggested and had its exemplification in the memorable labor of Schwendener. This was met, however, by lichenologists in a manner and tone often ill enough corresponding with the simply objective position of the other side; and there was room for further investigation. Ideally, from the point of view of those who look at lichens as autonomous, the primordial cell should be referable either to hypha or gonidium; but, in fact, as well emphasized by Minks, it is its dualism which, from the beginning of our knowledge, and through all its extent, characterizes the lichen structure, and determines its history. Yet this is not all. The penetrating glance of the cited vegetable anatomist has demonstrated the existence of a third element. Behind and before the manifestation of the hyphæ, which are to play so great a part in the lichen world, is a dimly seen, primordial tissue, a web or net-work of exceedingly delicate filaments (*Hyphema* Minks), which gradually pass into the hyphæ proper, as these accomplish their highest result in generating the gonimous cells."

ON THE TERMS ANNUAL AND BIENNIAL.—There is certainly much ambiguity in the terms annual and biennial. Those plants which germinate in the spring and die in the autumn are not very different from those which vegetate in the summer or autumn, and flower and die in the succeeding spring or summer; nor indeed can I see much between them and plants like *Agave*, which live in a barren state for many years, and then flower once and die. It seems to be only a question of the time required to concentrate the requisite energy to produce flowers and fruit. True annual plants may be divided into winter annuals and summer annuals. The former usually store up nutritive matter in the autumn to supply the flowering state in the spring; differing in this from summer annuals. But this is not constantly the case. The *Agave* is many years doing this. Although this plant flowers only once, we of course ought to have a term to distinguish it from the annuals. There are also the plants which produce stoles rooting at the end, such as the sympodes of *Fragaria*; in that case the plants are truly perennial. But see such plants as *Epilobium*, where the buds at the end of stoles alone remain alive during the winter, and produce the plants of the succeeding year: what are we to call these? We usually denominate them perennial. Then how separate them from those which are not aerial, but go through the same course? Then come such plants

as Orchis, where a new tuber is formed by the side of the old one each year, usually at a very short distance from it, but sometimes at some considerable distance, as in *Herminium*; and the tuber which has flowered dies. The tuber is therefore a winter annual. Of course all these ought not to be confounded with the true perennials, where the same root lives and flowers at least several years in succession. DeCandolle's terms *mono-* and *poly-carpic* will not do, for they convey another idea. *Mono-* and *poly-tocous*, as suggested by A. Gray, are better, but here we do not distinguish between *Agave* and *Brassica*. And he has not attempted to distinguish these from *Orchis* (except by calling the latter perennial, as we all do), or *Orchis* from *Fragaria*.—C. C. Babbington in *Four of Botany*.

A BOTANIST'S TRIP TO "THE AROOSTOOK." No. 2.—On June 6th, '81, my Western friend and I left Orono (Penobscot county) for Northern Maine, by way of the railroad as far as Mattawamkeag, where we passed a day pleasantly in following the banks of the river for flowers. On the stream of the same name I saw for the first time *Alnus viridis*, which afterwards became a daily occurrence; also *Crataegus coccinea*, with three of its forms; *pyrifolia* and *mollis* being quite abundant, as I found in September, when the fruit had matured. We traveled by stage to Patten (still Penobscot county), a distance of 38 miles through a most delightful country, but saw no new weeds by the roadside. At this place I procured seven of the plants, which were gathered on the Aroostook river the previous year in fruit. Perhaps this locality may be called the boundary line of some of these plants, as they do not grow either at Orono or Mattawamkeag (in writing this article I shall only speak of what I saw), but at Patten they were abundant. One morning we came across a large number of *Cypripediums*, among which was a purple *acaule* with two perfect flowers growing back to back. The greater part of them were pure white with yellow-green sepals and petals. After a week spent there, taking with us 16 new sketches and a large package of pressed plants, we staged it to Ashland, a ride of 48 miles. The beauty of the country beggars description. For a distance of 12 miles we were in full view of Mounts Ktaadn, Double and Round Top. A good-natured driver told us the names of all the hills, streams and ponds. It may seem strange to the reader that we discovered no new plants in this long ride, but the only novelty spied was a rose-pink *Viburnum lantanoides*. *Amelanchier Canadensis* vars. *rotundifolia* and *oligocarpa* were abundant but not new, neither were any of the shrubs. *Taxus baccata* var. *Canadensis* is quite common, but straggling and partially dead. *Acer Pennsylvanicum* and *spicatum* is the prevailing underbrush in many of the forests. But for our own voices the stillness would have been oppressive; for a distance of many miles that day we did not find an opening. The mail agent said that between us and Canada on

one side there was probably no house to be found. In one plantation through which we passed there were but two families living. There were but few houses along the road, yet one might almost believe that a village would spring up some time in this untrodden wilderness, whose tangled undergrowth makes it almost impenetrable. The forests often look black with the *Abies nigra* ("Black growth") and the dead trees are oftentimes covered with long green moss. We passed several cabins which are occupied by the lumbermen during the winter months. Ashland is a small, "finished" village, situated on the Aroostook river. The people whom we met there are hospitable and refined. I added *Arabis perfoliata*, *Rosa nitida*, and *Prunus pumila* to my list; also learned through Mrs. G. D. that *Trillium album* grows on their farm, but I was too late to procure it. This immediate region is said to be rich in minerals. After another week profitably spent, we took passage for Fort Kent, 48 miles due north, by a corduroy road. The first day we passed at Portage Lake, a famous resort of fishermen. We gathered some Potamogetons of great size, but they were not in flower, and the day was productive of pleasure alone. For miles the forests were burned and still smouldering, the work of careless gunners, it is supposed. A dismal swamp, indeed! The two fire-weeds, *Erechthites hieracifolia* and *Epilobium angustifolium*, are found here as elsewhere on burnt ground, although I have been told that the first named had never been found in the county; but it is quite abundant on the line of the railroad. The country is decidedly mountainous; the one, two and three mile hills would have been decidedly monotonous but for the lovely foliage and the frolicking brooks. In many places the road was "repaired," and the ditches at the sides were frightful for hypersensitive nerves to contemplate. Eagle lake was the great feature of the ride, it lays along the route for a distance of $5\frac{1}{2}$ miles. No part of the journey furnished excitement until the driver took his pistol out to load it, saying that he should have done so before starting; that he had been fired upon twice in two years, and might need to use it before reaching Fort Kent. He also stated that a peddler who had left this place by that road was never heard from and that his bones were probably bleaching in the woods somewhere. Although we were on the *qui vive* all the afternoon, we only saw the enemy, for whom he had prepared, quietly standing in their doorways looking as demure as possible. At 9.30 Saturday night we found ourselves in Major D.'s hospitable home, 200 miles due north of Bangor. Fort Kent may be called properly a French town. It is situated on the Fish river (its original name), which empties into the St. John river at this place. Nature has done much for this section of the State. The scenery is fine, the air is cool, and the people seem as happy twenty-two miles removed from a railroad (Edmundston, on the Canada side, being the nearest point), telegraph, doctor or drug store as

those do who have all the advantages of hourly intercourse with the world. It is a healthy place also, and the people welcome strangers to their midst with the characteristic hospitality of the county. Space will not admit of the list of plants made here, but the more rare ones were *Pyrola rotundifolia* and *secunda*, with their lovely varieties; also *P. minor*, *Vaccinium cæspitosum*, *V. uliginosum*, *Clematis verticillaris* (Mr. Niles), and *Pyrus sambucifolia*. The swamps at this place afford several orchids; these dark, damp places are favorable to this family of plants. *Habenaria orbiculata* often grows two feet high, with leaves seven by nine inches; *H. viridis* also very large. *H. obtusata* and *Listera convallarioides* abound here. It is hard work to procure them, requiring many a tumble and scratch, and the thought must often come to the mind of the most practical, Does it pay? Why all this toil for "weeds" which have little beauty save to the eye of the botanist? Yes, it does pay; our natures evermore grow young among the primitive pines. The scenery is wild and the silence oppressive. Some of the swamps seem like ponds filled with trees; the fallen ones often form pens, and how to get along, though armed to the teeth with waterproof and rubber boots, one does not know always. Suffice it to say that people who care to visit such places find their way out of them feeling well paid for the trouble. It is interesting to trace the outlines of large trees in the primitive woods. Some have a little bark left, while in other cases there is merely an outline of green or brownish dust. "How old are you?" I asked, half frightened at the sound of my own voice. I did not see a snake either year, and the squirrels and birds did not seem startled, as they do elsewhere. There are but few flowers in the pathless woods; many a hard day's work was lost in search of plants in the primitive forests, but in the "clearings" they are more abundant. The banks of the rivers and ponds furnish more still. St. Francis, 18 miles further up the St. John river, afforded me a white form of *Prunus Pennsylvanica*, *Rhinanthus Crista-galli*, *Euphorbia helioscopia*, *Potentilla frigida*, *Gentiana Andrewsii*, *Funcus Vaseyi*, *Graphephorum melicoidis*, and *Triticum repens*. The small islands in this neighborhood are rich in interesting work. On the way "out" in September I gathered *Goodyera Menziesii* and *Botrychium lanceolatum*; at another place *B. simplex* was abundant, and at Houlton *Lappa officinalis* vars. *major* and *tomentosa*. The former grows five feet high and the lowest leaves often measure more than 18 inches across. These are but few of the many interesting plants which grow in this fascinating county. Go and see.—*Kate Furbish*.

BOTANICAL NOTES.—J. C. Arthur in Vol. III of the Proceedings of the Davenport Academy of Sciences, publishes "Contributions to the Flora of Iowa, No. IV," in which he adds forty-three native and six introduced species to his previous lists. Descriptions are given of such as are not found in Gray's

Manual, viz: *Artemisia serrata* Nutt., *Senecio lugens*, Rich., var. *Hookeri* Eaton, *Plantago Rugelii* Decaisne, *Gerardia tenuifolia* Vahl., var. *macrophylla* Benth., *Cuscuta Gronovii* Wild., var. *latifolia* Engelm., *Polygonum Muhlenbergii* Watson, *Aristida purpurea* Nutt.—F. A. Mansfield has compiled a list of plants (137 species and varieties) “discovered in Maine, chiefly since the publication in 1868 of the ‘Portland Catalogue of Maine Plants.’”——N. L. Britton has issued a circular of “Notes” for the guidance of those who have the “Preliminary Catalogue of the Flora of New Jersey.” Attention is directed to many doubtful natives, and difficult species, and also to the common names of plants.—“The Index to the genus *Carex* of Gray’s Manual,” by Jos. F. James, issued as an extra in the *Botanical Gazette*, will prove very useful to all students of that large genus.—The list of New Mexico and Arizona plants collected by H. H. Rusby, contains many interesting species. Sets of these are offered for sale by the collector at Franklin, N. J.——The February numbers of our botanical journals are full of interest. N. L. Britton in the *Torrey Bulletin* describes and figures (three fine colored plates) a new hybrid oak, between *Quercus Phellos* and *Q. nigra*, and which he names *Q. Rudkini*. E. L. Greene describes six new Compositæ, mostly Californian; J. B. Ellis describes sixteen new species of fungi mostly from New Jersey; and G. E. Davenport contributes interesting “Fern Notes,” in which he gives reasons for suspecting *Asplenium ebenoides* to be a hybrid between *Camptosorus rhizophyllus* and *Asplenium ebeneum*.——Dr. Engelman’s “Notes on *Yucca*,” in the *Botanical Gazette* include the description of a new species, *Y. elata*, from the deserts of Arizona. L. M. Underwood brings together in an alphabetically arranged catalogue the genera and species of North American Hepaticæ. It includes forty-nine genera, 219 species and seventeen varieties.—In Jos. F. James’s paper on “The Variability of the Acorns of *Quercus macrocarpa*,” in the Jour. Cinn. Soc. Nat. Hist., the author brings out to a remarkable degree the variable character of the acorn of our common bur-oak. “There are all gradations from no fringe at all on the cup, to one which has a fringe half an inch long. The cups are shallow to deep, thick to thin, extending half way up the acorn, reaching to its apex, or almost entirely concealing it.” Eight figures accompany the paper.

ZOOLOGY.

NOTE ON THE GEOGRAPHICAL DISTRIBUTION OF CERTAIN MOLLUSKS.—The occasion for this note arises from a brief review of Professor A. G. Wetherby’s paper “On the Geographical Distribution of certain Fresh-water Mollusks of North America, and the probable causes of their variation,” in this journal, March, 1882, page 231. The entire paragraph reads, “The Strepoma-